

A system of the monocots—derived from Nymphaeaceae, these in turn having as old an origin as Amentiferae, Laurales, Piperales, and the main line of the dicots—is duly set forth.

So much for Takhtajan's conception of the phylogeny of the flowering plants, in which only some three or four points have appeared to call for serious question. We shall not abandon detailed studies of species and groups; I expect, however, that the results of these studies will tend to strengthen the hypotheses of relationship which Takhtajan has set forth very much more frequently than they will tend to weaken them.

In the taxonomic expression of his phylogenetic hypotheses, Takhtajan has divided several families; recognized numerous orders of few families (of dicots and monocots together, he has provided eighty-two orders, grouped in eighteen superorders); and designated every order by the stem of a generic name with the termination *-ales*. These practices are the current style or mode-trend. I deprecate them. Is a well-founded opinion, that some two or three families belong together, of sufficient significance to require expression in the category of orders? On most occasions, I think not; what we wish to know of each family is to what group of a dozen or more families it belongs. And as to names, to write Theales (or Guttiferales), Ericales, Malvales, or Gentianales, is to contribute to erasing from memory some of the facts of history, namely that these groups were known, during a period of a century or more, as the orders Guttiferae, Bicornes, Columniferae, and Contortae.—HERBERT F. COPELAND, Sacramento City College, Sacramento 22, California.

Blakeslee: The Genus Datura. By AMOS G. AVERY, SOPHIE SATINA, and JACOB RIETSEMA. xli+289 pp., frontispiece, 67 figs, 34 tables. The Ronald Press Co., New York, 1959. \$8.75.

This volume is a monumental review of investigations on the genus *Datura*. The authors, all collaborators of Dr. Alfred Francis Blakeslee, internationally recognized expert in genetics and leader of a devoted group of associates, have given a complete account of more than 40 years of scientific research on this justly famous genus. Focused on genetical studies, the research program was one of the broadest and most complete ever made of plants comprising a single genus. Included is a complete *Datura* bibliography of the 228 published papers of Dr. Blakeslee and associates. An interesting feature is a historical review of the taxonomy of the genus including descriptions, figures, and notes on the ten known species included in the sections *Stramonium*, *Dutra*, and *Ceratocaulis*. Section *Brugmansia*, regarded by many taxonomists as a separate genus, is not considered. The sole published summary of the *Datura* nomenclature from 1753 is also included. Nearly 1,400 collections of *D. stramonium*, the most widely investigated species, from many localities scattered all over the temperate zones were grown and studied.

The advanced student of genetics and the tyro alike should find much of interest in the preface, the foreword, and the historical review. The former will be reminded of the tremendous contributions to our understanding of fundamental genetical phenomena made through the investigation of one genus, of the ramifications which result from following up promising leads, and of the influence these researches have had on subsequent biological thinking and experimentation. If the tyro reads no more than the historical review by A. G. Avery, with its account of the medical, ceremonial, and cultural influences of this widely known solanaceous genus, his imagination should be stimulated. He should come away with an appreciation of the depth of genetical roots as he visualizes Kolreuter, Gaetner, Naudin, Godron, de Vries, and Bateson at work on these puzzling plants. In this account, as well as in Dean Sinnott's biographical sketch of Dr. Blakeslee, the career of a distinguished teacher, organizer, and investigator stands revealed in a stimulating manner, while attention is drawn to a magnificent cooperative venture.

A short chapter on the alkaloids of *Datura* by Edward Leete refers to the chemistry, distribution, pharmacology, and biogenesis of these useful substances and clearly indicates the need for further information at both practical and theoretical levels.

For many readers the chapters on "Chromosome Number and Morphology," "Polyploidy," and "Extra-Chromosomal Types" will strike responsive chords. They will be reminded of the use of Belling's iron-acetocarmine technique, of plant breeding methods, of the production of induced polyploids, and of the use of cold, injury, radiation, growth substances, and various other chemicals, including the pioneering work on the use of colchicine, as aids in experimentation. Interesting and valuable ideas were developed through combined cytological and genetical examination of the polyploids and extra-chromosomal types. Segmental interchange and ring formation, comparisons of the effects of single additional chromosomes with the duplication of complete sets of chromosomes, and the evolution of genetic systems come readily to mind as one flips the pages concerned with the details of these and other important phenomena.

Only two allelomorphous pairs of characters had been described prior to 1919 when Blakeslee and Avery reported the first of numerous mutations observed by the Cold Spring Harbor group. The total number of known gene pairs approaches 550 and, among plants, is probably exceeded only by those in *Zea*. These mutations affect all parts of the plant, have appeared either spontaneously or, more often, as a result of a variety of treatments, and are discussed at some length in the chapter on "Gene Mutations." Because of the enormous amount of work required, relatively little attempt was made to locate most of the genes. Nevertheless, genes responsible for 81 distinct mutations representing twelve linkage groups have been located. Methods for constructing maps of the several chromosomes are described. Certain markers have been very useful in various investigations of particular interest, including those investigations affecting male and female sterility.

Miss Satina's short, compact, and beautifully illustrated and organized chapter on "Chimeras" deserves careful reading. Here emphasis on the advantage of utilizing chimeras for obtaining information on the histogenesis of plant structures merits reiteration. The controversy on the origin, nature, and organization of apical meristems and other initials has engaged the attention of many botanists over a long period of years. Perhaps further study of chimeras along the lines suggested by the *Datura* work will help elucidate this perennial problem and will also offer evidence for the diverse functions of the epidermis which have been suggested. The use of periclinal chimeras as a tool in investigating a variety of morphogenetic problems should receive wider recognition.

A chapter on "Radiation Experiments" by A. G. Avery and Jean Cummings gives considerable detail on both methods and results. In this review, already becoming too lengthy, the chapter summary seems to be an efficient device for giving its essence:

In *Datura*, as in so many other organisms, radiations have been very useful as inducers of genic and chromosomal mutants, and these in turn have been helpful in clarifying the answers to many questions of morphogenesis and physiology. On the other hand, it has been possible to use the knowledge gained from irradiated plants in the comparison of the effectiveness of different types of radiations—thermal and fast neutrons from various sources. To a great extent the conclusions seem clear-cut. All the radiations so far tested seem to cause the same types of both genic and chromosomal aberrations, but the effectiveness of the different radiations is quite different. Neutrons cause much greater effects, both genic and chromosomal, than do either x-rays or gamma rays for equivalent energies.

Geneticists have long since learned the need for a thorough knowledge of the life history of any experimental organism and the *Datura* team is no exception. Clear descriptions of the growth and activity of the tissues associated with reproduction, fertilization, and of the development of the embryo, endosperm, and seed coats are given by Satina and Rietesema in chapters 10 and 11.

"Barriers to Crossability: Prefertilization" and "Barriers to Crossability: Post-fertilization" are two important chapters full of suggestions for future research. An inventive and imaginative approach to many experimental problems is presented.

Extensive studies of pollen viability, germination, and pollen-tube growth are summarized. The fate of embryos and endosperm in incompatible crosses, the growth of ovular tumors, and the physiological aspects of seed abortion are among the topics discussed.

In later years special attention has been paid to the vital link between generations, the seed. Problems of incompatibility, sterility, and abortion required attention and led to the development of a method for the culture of embryos. Many observations have led to a partial understanding of the numerous complex processes going on simultaneously in the growing seed. Here are dozens of unsolved problems for which the *Datura* investigators suggest promising lines of attack.

In the chapter on "Segmental Interchanges and the Species Problem," Miss Satina assembles considerable material on prime types, racial differences, interspecific hybrids, and the characteristics of hybrids from incompatible crosses. The problems of chromosome analysis, ring formation, and of chromosome-end arrangements are examined. The abundant occurrence of segmental interchange present in the various races of *Datura* is unusual, but the condition is known in some other plants. In spite of intensive study, the exact relationship of the phenomenon to speciation remains obscure. We may agree with Blakeslee when he says that, "The frequency of interchange of chromosomal fragments in *D. stramonium* and the relation of this phenomenon to the formation of new pure-breeding types has led to the hypothesis that segmental interchange has accompanied the changes responsible for the formation of species in the genus *Datura*. Nevertheless, in spite of very intensive study the relationship of the phenomenon to speciation remains obscure." We may hope that some day *Datura* will be a valuable instrument in helping us work out the relationship between genes and chromosomes which will further our understanding of the evolutionary picture.

The scientific world owes its gratitude to Smith College and the National Science Foundation for contributing assistance, facilities, and finances towards the completion of this work. Congratulations are due the Ronald Press for its part in this fine enterprise, for the volume is pleasing in all aspects. High praise is due the committee of the Genetics Society of America which catalyzed the reaction which resulted in the publication of this labor of love.

Attention should be called to page three of the volume, which carries an invitation to investigators interested in securing material of the Jimson weed in order to add further chapters to our knowledge of the members of this fascinating genus.—ALTON H. GUSTAFSON, Department of Biology, Bowdoin College, Brunswick, Maine.

Vascular Plants of the Pacific Northwest. By C. LEO HITCHCOCK, ARTHUR CRONQUIST, MARION OWNBAY, and J. W. THOMPSON. Illustrated. University of Washington Press. Part 5, pp. 1-343. 1955. \$7.50. Part 4, pp. 1-510. 1959. \$12.00.

Present or future students of the Pacific Northwest flora will find their time well spent in carefully looking through the two volumes now available of the projected five-volume "Vascular Plants of the Pacific Northwest." It is a credit to the authors that they have drawn on their wide experience in the western flora to point out and discuss specific problems such as unusual variation patterns, possible hybridization, disjunct or vicarious distributions, and a host of other phenomena which suggest a number of areas requiring the attention of biosystematists, plant geographers, genealogists, and cytologists. This is merely a bonus added to a sound taxonomic treatment of the 4000 vascular plants (upon completion) either native or introduced in "all of Washington, the northern half of Oregon, Idaho north of the Snake River Plains, the mountainous portion of Montana, and an indefinite southern fringe of British Columbia." The area circumscribed is a natural floristic unit and excludes most of the interesting but large Great Basin flora occurring in the southern portions of Idaho and Oregon as well as the sizable cluster of endemic or California-centered species characteristic of southwestern Oregon.

The two volumes published to date are Parts 4 and 5 of the series: Part 5 is a